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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/698,889	10/31/2003	Qing Ma	42.P16639	2954
7590		02/03/2005	EXAMINER	
Tood M. Becker		SUMMONS, BARBARA		
BLAKELY, SOKOLOFF, TAYLOR & ZAFMAN LLP		ART UNIT		
Seventh Floor		PAPER NUMBER		
12400 Willshire Boulevard		2817		
Los Angeles, CA 90025-1026		DATE MAILED: 02/03/2005		

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	Application No. 10/698,889	Applicant(s) MA ET AL.	
	Examiner Barbara Summons	Art Unit 2817	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☐ Responsive to communication(s) filed on \_\_\_\_.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-42 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-42 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 31 October 2003 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |   |  |
|---|--|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. ____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                  | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)            |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date ____ | 6) <input type="checkbox"/> Other: ____  |

## DETAILED ACTION

### *Drawings*

1. The drawings are objected to under 37 CFR § 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the impedance matching unit that “comprises a coil transformer” as recited in claim 13, must be shown in the drawings or the feature(s) canceled from the claim(s). No new matter should be entered.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as “amended.” If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either “Replacement Sheet” or “New Sheet” pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

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***Specification***

2. The disclosure is objected to because of the following informalities: On page 10, line 21, note that "form" should be - - from - -.

Appropriate correction is required.

3. The specification is objected to as failing to provide proper antecedent basis for the claimed subject matter. See 37 CFR 1.75(d)(1) and MPEP § 608.01(o). Correction of the following is required: an impedance matching unit that comprises "a coil transformer" must be discussed in the specification.

***Claim Objections***

4. Claim 17 is objected to because of the following informalities:

Claim 17 recites "the impedance matching unit" which is unclear as to which of the previously recited "input" or "output" impedance matching unit is being referred to (see claim 14). It appears that "the impedance matching unit" should be changed to recite - - the input impedance matching unit or the output impedance matching unit - - as correctly recited in claims 18-21, for example.

Appropriate correction is required.

***Claim Rejections - 35 USC § 112***

5. The following is a quotation of the second paragraph of 35 U.S.C. § 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

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6. Claims 26-30 are rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 26 is unclear because it lacks antecedent basis for "the output impedance matching unit". Should claim 26 correctly depend from claim 23?

Claims 27-29 are unclear because they lack antecedent basis for "The system". Should claims 27-29 correctly depend from claim 23?

Claim 30 is unclear because it is identical to the claim from which it depends. Should claim 30 correctly depend from claim 23? Also, it appears that in claim 30, on line 1, "apparatus" should then be changed to - - system - - as recited in claim 23.

In any art rejections that may follow, the Examiner will consider claims 26-30 to depend from claim 23, which provides antecedent basis for both "input" and "output" impedance matching units and for "The system".

Clarification is required.

### ***Claim Rejections - 35 USC § 102***

7. The following is a quotation of the appropriate paragraphs of 35 U.S.C. § 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

8. Claims 1-3, 6, 7, 14-16, 19, 20, 22-25, 28, 29, 31, 32, 35, 37 and 41 are rejected under 35 U.S.C. §§ 102(a) and 102(e) as being anticipated by Ohara et al. Published U.S. Application No. 2003/0067368.

Fig. 17 of Ohara et al. discloses an apparatus comprising: a film bulk acoustic resonator (FBAR)[see e.g. the abstract] filter having an input 14 and an output 15; an input impedance matching unit 13 that is a shunt inductor followed by an in-line capacitor; an output impedance matching unit 13 that is an in-line capacitor followed by a shunt inductor; and wherein the FBAR filter is a ladder filter.

Regarding claim 3, Figs. 13 and 14 show the FBAR filter as a lattice filter still having the input/output impedance matching units.

Regarding claims 22, 23, 31, 32 and 37, the apparatus is to be provided in a communication system and that includes the process of matching the input/output impedances of the expected system (see e.g. the last four lines of section [0181]), wherein the system includes one input/output circuit being an antenna and one input/output circuit being a "frequency processing system" of a radio device, for example, a transmit circuit or receive circuit (see section [0193]). The process thereby also includes coupling the input/output impedance matching units to the FBAR filter and the input/output circuits (not shown but connected to input 14 and output 15 of the filter), respectively.

Regarding claims 15, 16, 24 and 25, the Examiner is giving the broadest possible interpretations to the limitations "different constructions" and "same construction". Therefore, the input and output impedance matching units are considered to have

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"different constructions" in that the input impedance matching unit is a shunt inductor followed by an in-line capacitor while the output impedance matching unit is an in-line capacitor followed by a shunt inductor. And, the input and output impedance matching units are considered to have the "same construction" in that they both have the construction of a shunt inductor and an in-line capacitor.

9. Claims 1-3, 12 and 22 are rejected under 35 U.S.C. § 102(e) as being anticipated by Ella et al. U.S. 6,670,866.

Figs. 8 and 9 disclose an apparatus comprising: a film bulk acoustic resonator filter that is either a ladder filter 120 (Fig. 8) or a lattice filter 150 (Fig. 9), the filter having an input and an output; and an impedance matching unit 10 that is a balun (i.e. balanced to unbalanced circuit) formed of an FBAR stack (Fig. 7) that matches impedance by transforming the impedance at a ratio of 1:4 (see col. 11, lines 20-26). Regarding claim 22, see e.g. Fig. 10 that shows a system wherein the input circuit is antenna 400, and the balun 10 matches the impedance of the antenna to the input of the receive filter 150 or the device would not adequately function.

### ***Claim Rejections - 35 USC § 103***

10. The following is a quotation of 35 U.S.C. § 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

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This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

11. Claims 4, 5, 8-11, 13, 17, 18, 21, 26, 27, 30, 33, 34, 36, 38, 39, 40 and 42 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Ohara et al. U.S.

Published Application No. 2003/0067368 taken alone.

Ohara et al. discloses the invention as discussed above, except for the impedance matching units comprising the specifically recited different inductor/capacitor configurations, or a balun or a transformer coil.

The Examiner takes Official notice that the configurations listed are all known art recognized alternate interchangeable impedance matching units, as evidenced by other art of record (see e.g. Ella et al. applied above that shows a balun and other art cited below shows the other configurations).

Consequently, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified the FBAR filter of Ohara et al. (see e.g. Fig. 17) by having replaced the impedance matching units 13 with other configurations of inductors and/or capacitors or with a balun or a transformer coil, because such obvious modifications would have been the mere substitution of art recognized alternate



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interchangeable impedance matching circuits, as would have been known by one of ordinary skill in the art.

### ***Conclusion***

12. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Beaudin et al. U.S. 6,710,677 discloses (Fig. 2) a ladder filter with input and output impedance matching circuits formed of inductors and/or capacitors (see col. 5, lines 19-24), thereby providing evidence that impedance matching circuits with various combinations of inductors and capacitors are "known in the art". Additionally, it should be noted that Beaudin et al. also provides evidence of the electrical equivalence of FBARs and surface acoustic wave (SAW) resonators (see col. 4, lines 16-20) and impedance matching with SAW resonator filters has been known and would be applicable to the electrically equivalent FBAR filters.

Tikka et al. U.S. 6,741,145 discloses FBAR filters (Figs. 15 and 16) with an impedance matching circuit in a system.

Frank U.S. 6,489,862 discloses an interstage matching network for power amplifiers 24 (Fig. 2), wherein the interstage matching network (Fig. 4) includes an FBAR filter with an input matching circuit of a shunt inductor followed by an in-line capacitor and an output matching circuit of an in-line inductor and a shunt capacitor.

Vale U.S. 5,291,159 discloses a FBAR filter (see Fig. 3 and col. 3, lines 61-62) with input/output impedance matching transformers (see e.g. col. 3, lines 39-42).

Onishi et al. U.S. 5,892,418 discloses (Fig. 9) a SAW lattice filter 3 with input matching circuit 19 (and an output matching circuit not shown see col. 24, lines 35-39) and discloses that it is known to use such circuits when the electrode design alone cannot match the impedance (see col. 24, lines 18-21) which teaching would also apply to the electrically equivalent FBAR filters.

Pond U.S. 3,737,814 discloses (Fig. 1) a piezoelectric crystal filter (i.e. a bulk acoustic wave resonator filter precursor to thin film bulk acoustic resonator filters) that has an output impedance matching circuit comprising a transformer coil 46 (see col. 3, lines 43-45), thereby providing evidence that transformer coil impedance matching circuits would have been known in the art.

Hikita et al. U.S. 4,803,449 discloses a SAW ladder filter (Fig. 10) that is electrically equivalent of FBAR ladder filters, having input and output matching circuits each formed of an in-line inductor and a shunt inductor 132, 142 and 152, 162, thereby providing evidence that two inductor matching circuits would have been known.

Takahashi et al. U.S. 6,121,859 discloses (Fig. 2) a SAW filter 4 having input/output impedance matching circuits 6 and 8 formed of inductors and/or capacitors, and specifically (see Fig. 5A) an in-line capacitor C1 and a shunt capacitor C2, thereby providing evidence that two capacitor matching circuits would have been known.

Nakamura et al. U.S. 6,683,515 discloses impedance matching circuits of various configurations (see Fig. 6) including in-line inductors and shunt capacitors, thereby providing evidence that such matching circuits would have been known alternatives.

Mancini U.S. 5,661,443 provides evidence that input and output impedance matching circuits need not be the same or have "the same configuration" (see col. 3, lines 53-58).

Jones U.S. 5,051,711 discloses a related crystal filter with input and output matching circuits (Figs. 2 and 3) comprised of in-line capacitors and shunt inductors.

Fraser et al. U.S. 5,216,392 discloses also discloses a crystal filter with input and output matching circuits (Figs. 1 and 2).

Swanson et al. U.S. 4,246,554 also discloses a crystal filter with input and output matching circuits formed by an in-line inductor and shunt capacitor.

13. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Barbara Summons whose telephone number is (571) 272-1771. The examiner can normally be reached on M-Th, M-Fr.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Bob Pascal can be reached on (571) 271-1769. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

bs  
January 31, 2005



**BARBARA SUMMONS  
PRIMARY EXAMINER**